⊕ ⊖ Computational ⊗ ⊘ Photography

HelloCamera

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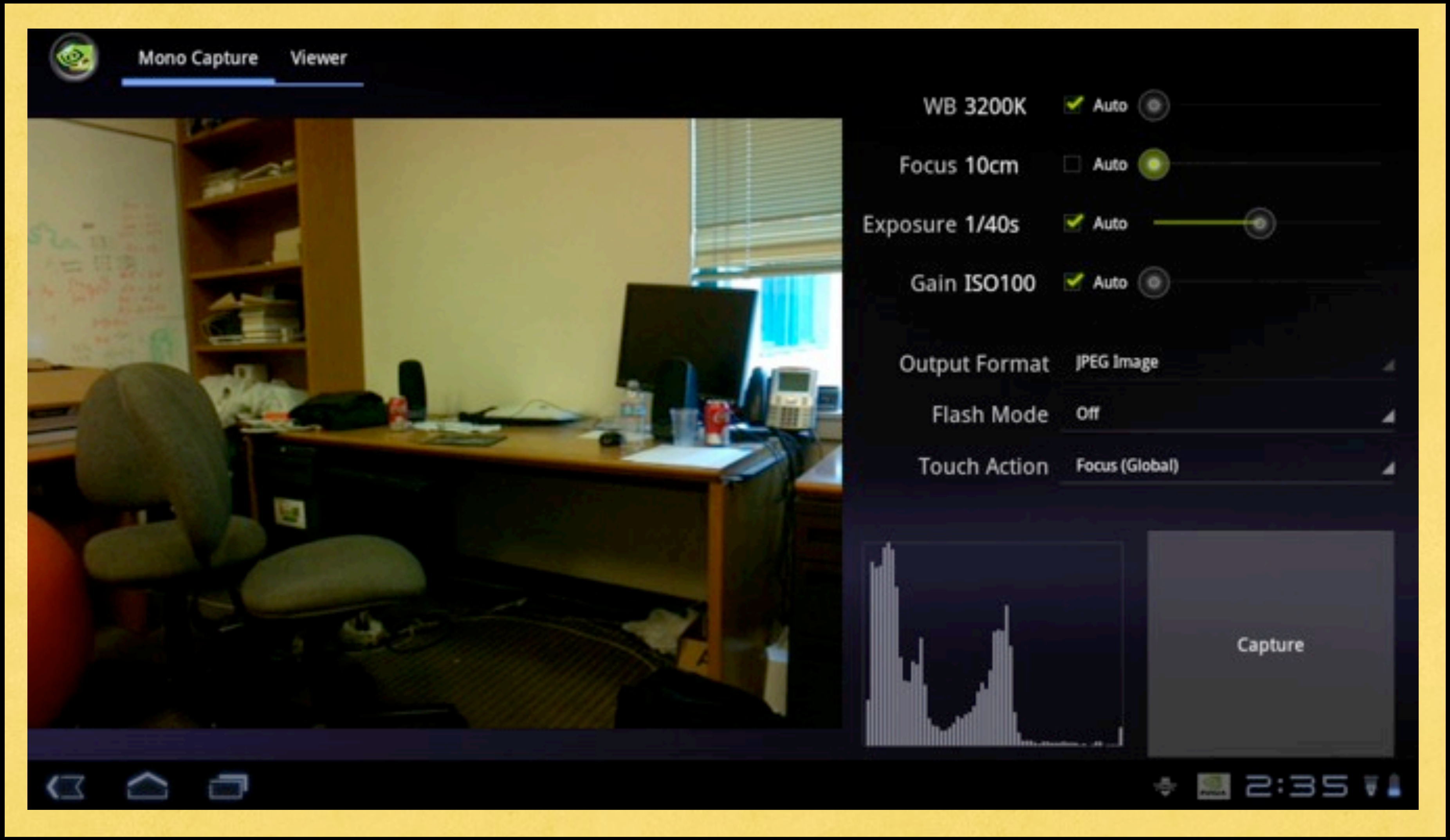
CS 478 Lecture
Jan 23, 2012

Overview

- You are handed:
  - a functional camera app, minus autofocus.
- You are to hand in:
  - an implementation of autofocus algo.
  - some extensions.

Meet FCamera



WB 3200K ☑ Auto

Focus 10cm □ Auto

Exposure 1/40s ☑ Auto

Gain ISO100 ☑ Auto

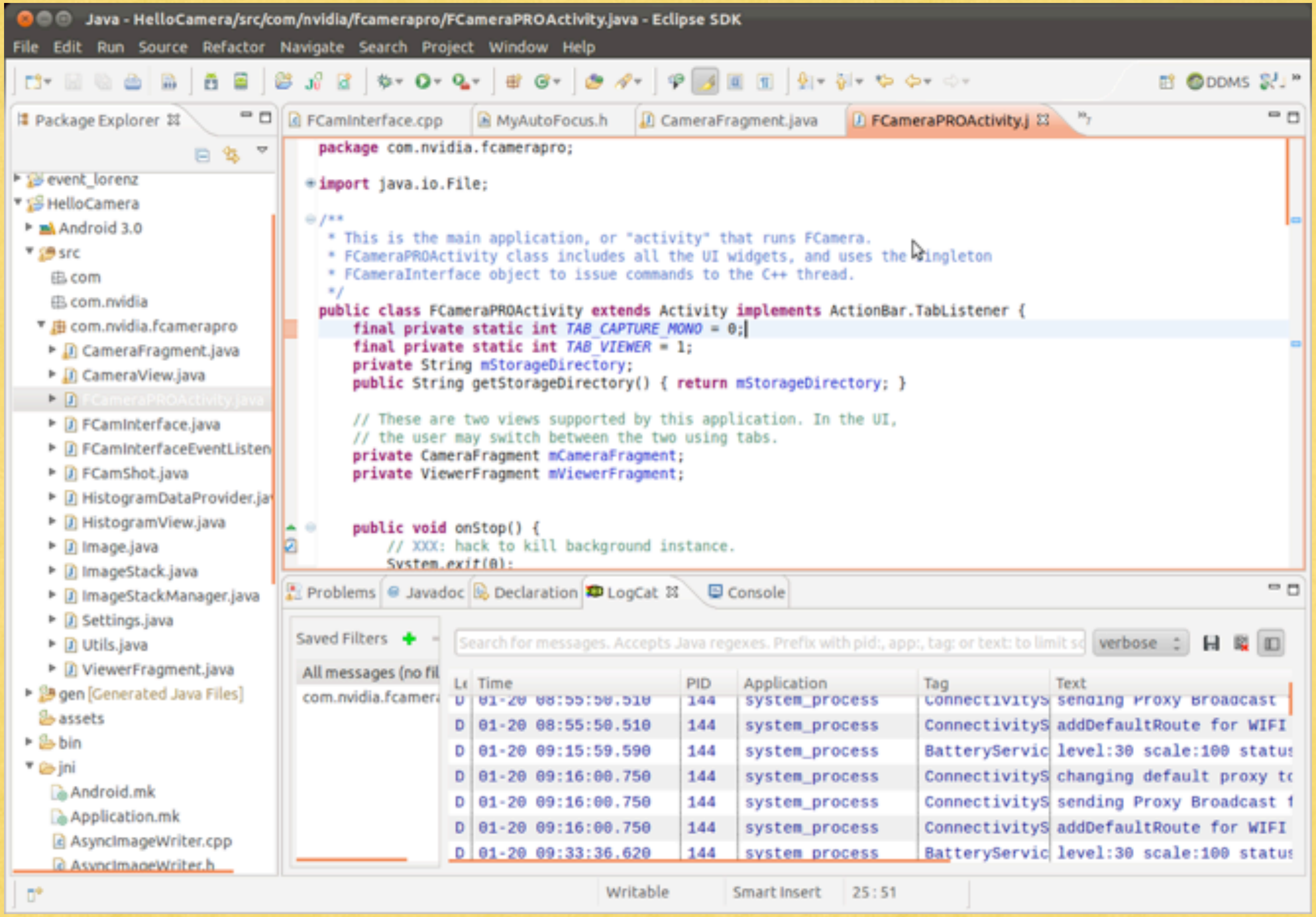
Output Format: JPEG Image

Flash Mode: Off

Touch Action: Focus (Global)

Meet TADP

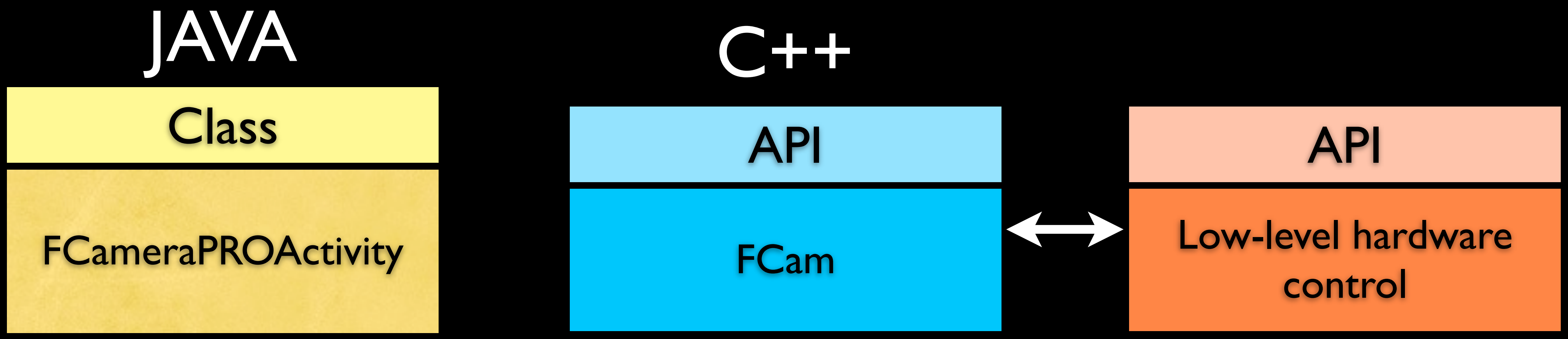
Tegra Android Developer Pack



```java
package com.nvidia.fcamerapro;

import java.io.File;

/**
 * This is the main application, or "activity" that runs FCamera.
 * FCameraPROActivity class includes all the UI widgets, and uses the singleton
 * FCameraInterface object to issue commands to the C++ thread.
 */
public class FCameraPROActivity extends Activity implements ActionBar.TabListener {
    final private static int TAB_CAPTURE_MONO = 0;
    final private static int TAB_VIEWER = 1;
    private String mStorageDirectory;
    public String getStorageDirectory() { return mStorageDirectory; }

    // These are two views supported by this application. In the UI,
    // the user may switch between the two using tabs.
    private CameraFragment mCameraFragment;
    private ViewerFragment mViewerFragment;


    public void onStop() {
        // XXX: hack to kill background instance.
        System.exit(0);
```

```
L  Time                PID  Application     Tag            Text
D  01-20 08:55:50.510  144  system_process  ConnectivityS  sending Proxy Broadcast
D  01-20 08:55:50.510  144  system_process  ConnectivityS  addDefaultRoute for WIFI
D  01-20 09:15:59.590  144  system_process  BatteryServic  level:30 scale:100 status
D  01-20 09:16:00.750  144  system_process  ConnectivityS  changing default proxy to
D  01-20 09:16:00.750  144  system_process  ConnectivityS  sending Proxy Broadcast f
D  01-20 09:16:00.750  144  system_process  ConnectivityS  addDefaultRoute for WIFI
D  01-20 09:33:36.620  144  system_process  BatteryServic  level:30 scale:100 status
```

Organization



JAVA

Class

FCameraPROActivity

C++

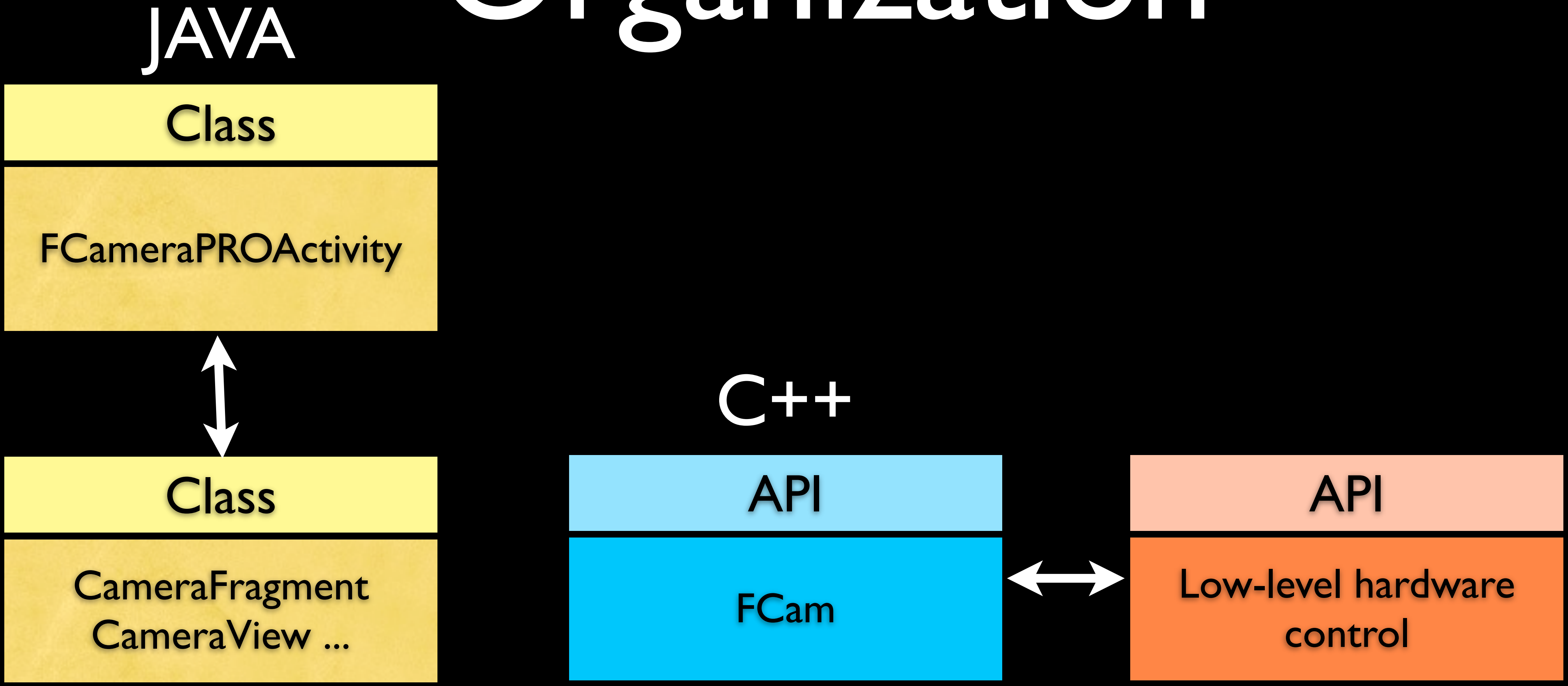
API

FCam

API

Low-level hardware control

Organization



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CameraFragment
CameraView ...

C++

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Low-level hardware control

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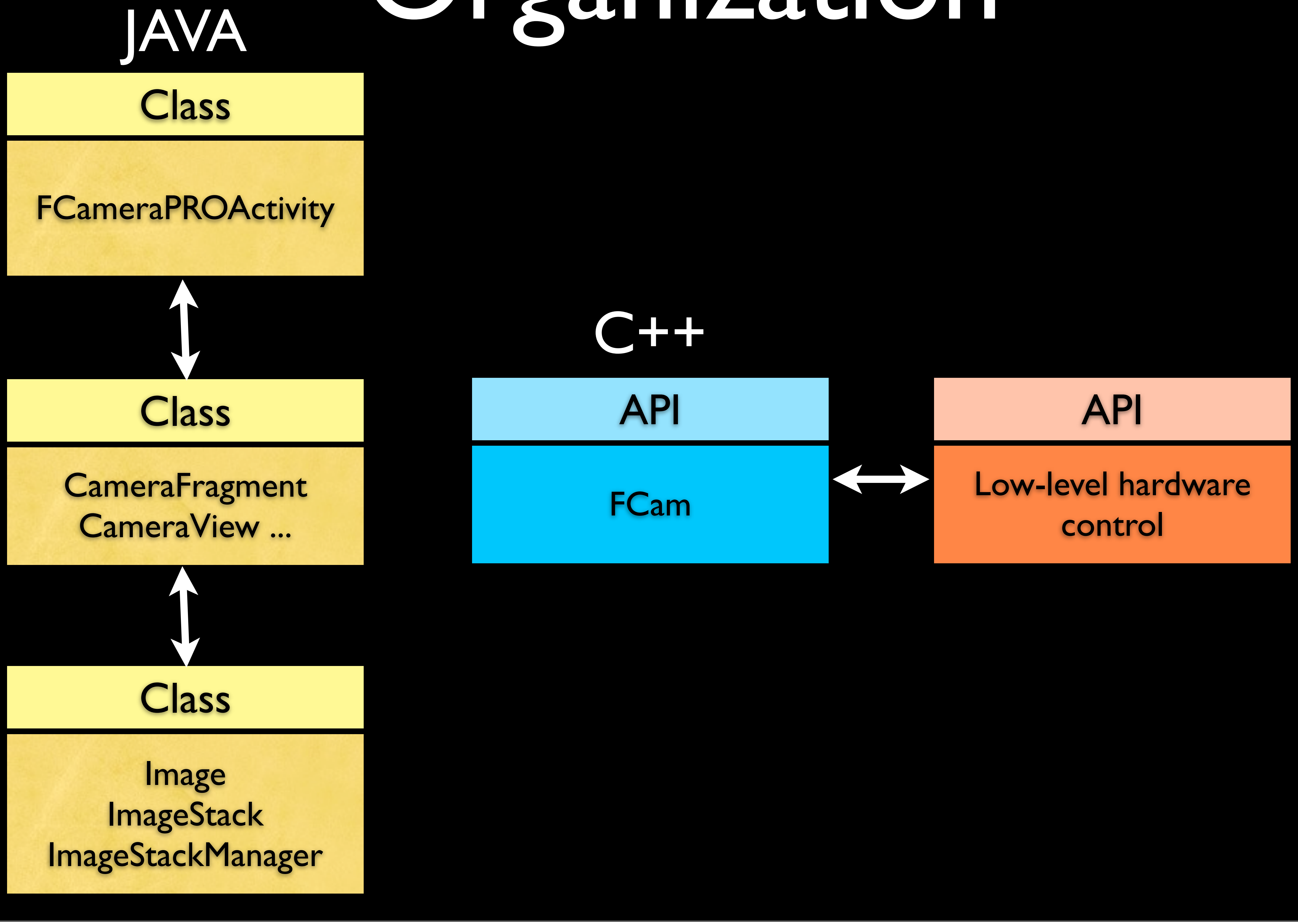

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CameraFragment
CameraView ...

Class

Image
ImageStack
ImageStackManager

C++

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Low-level hardware control

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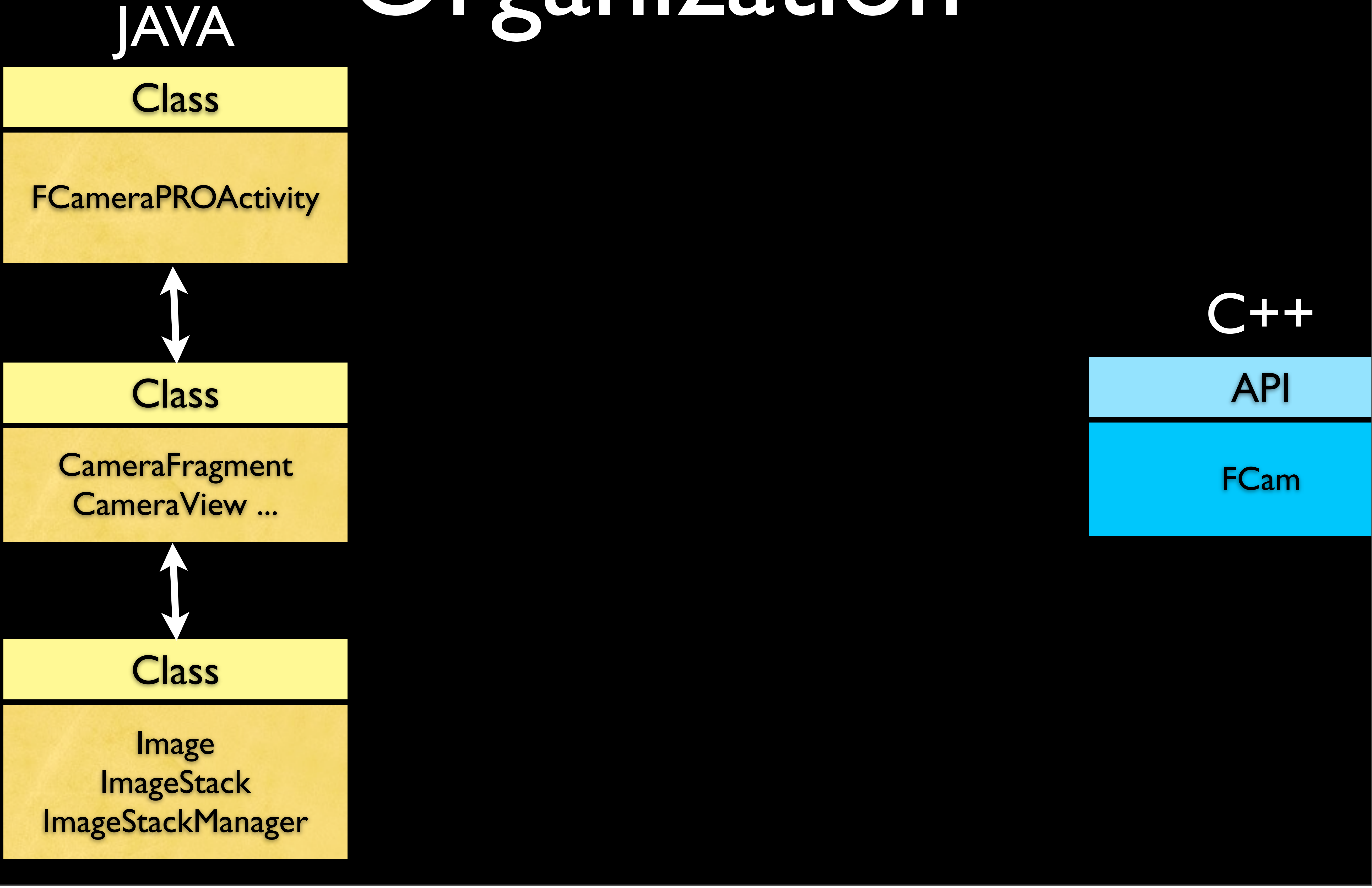

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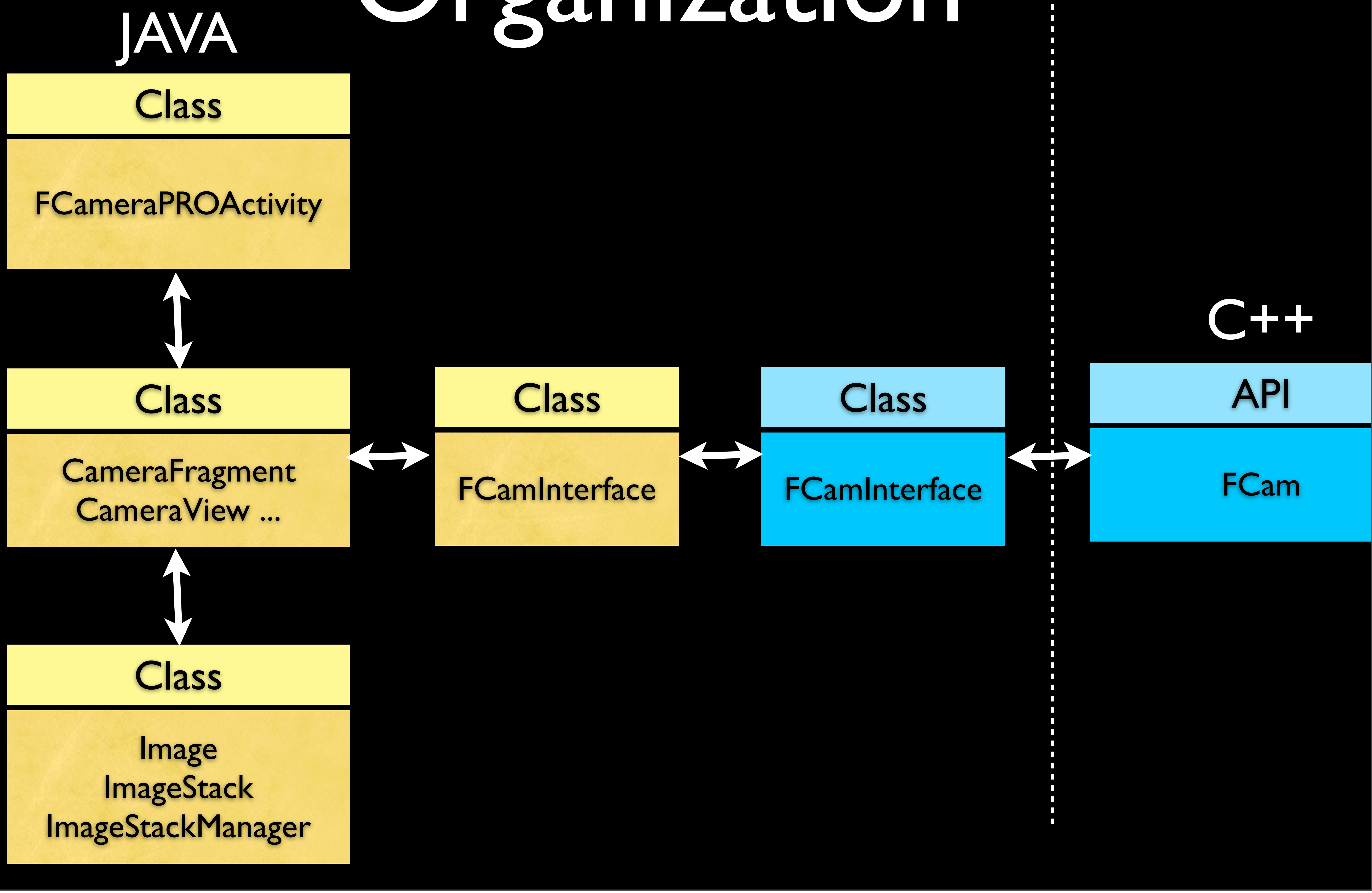

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FCamInterface

Class

FCamInterface

C++

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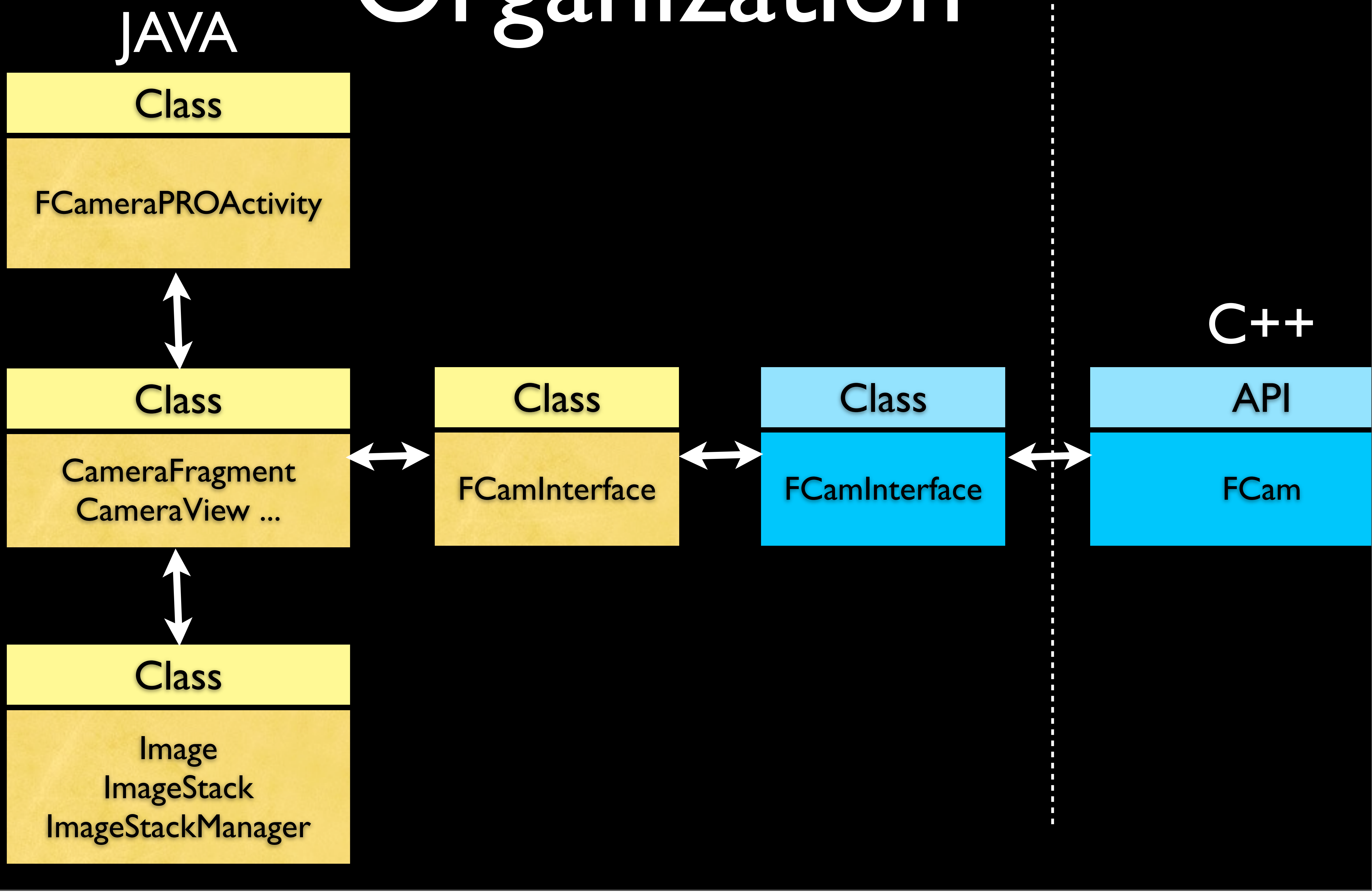

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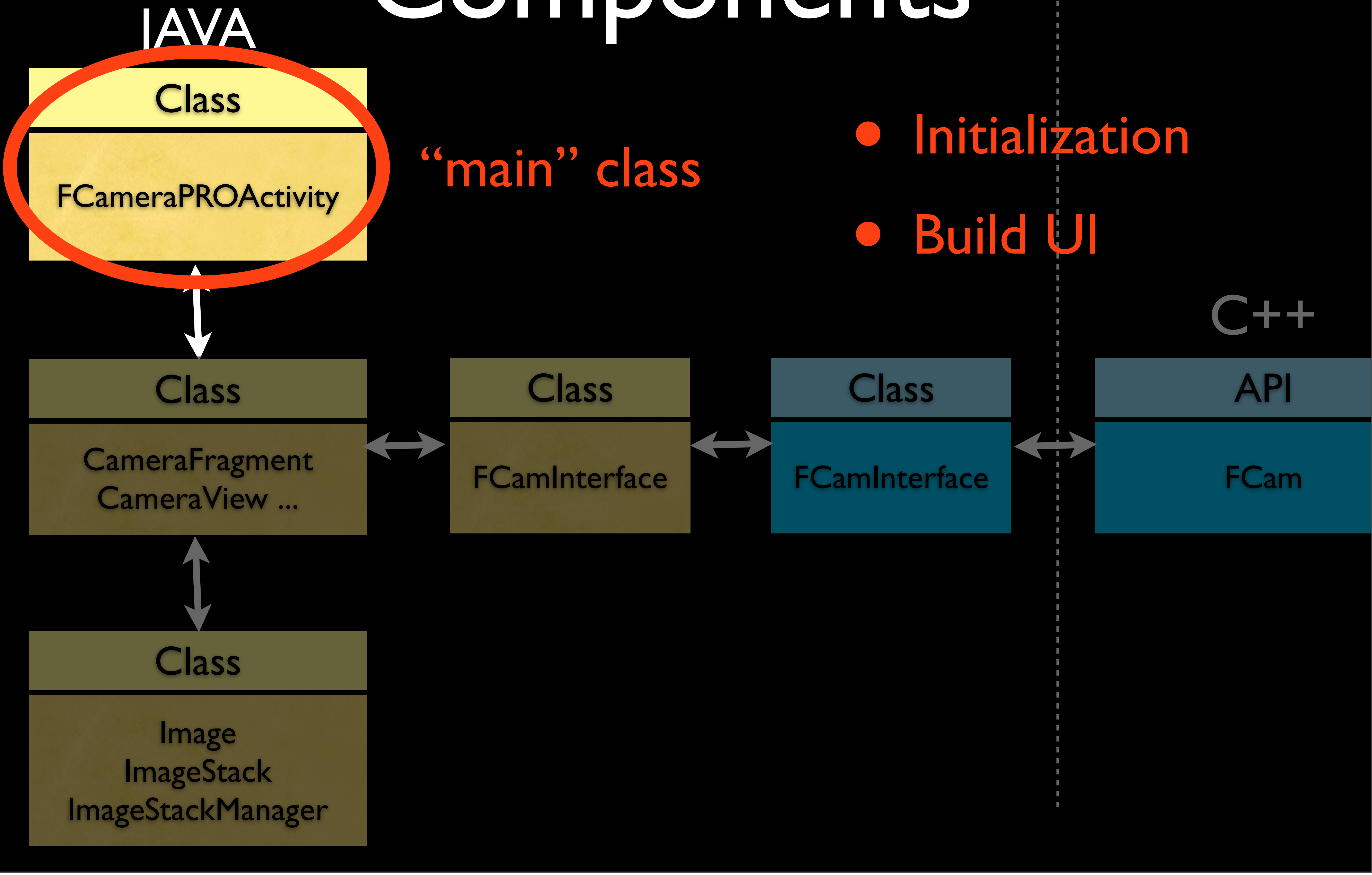
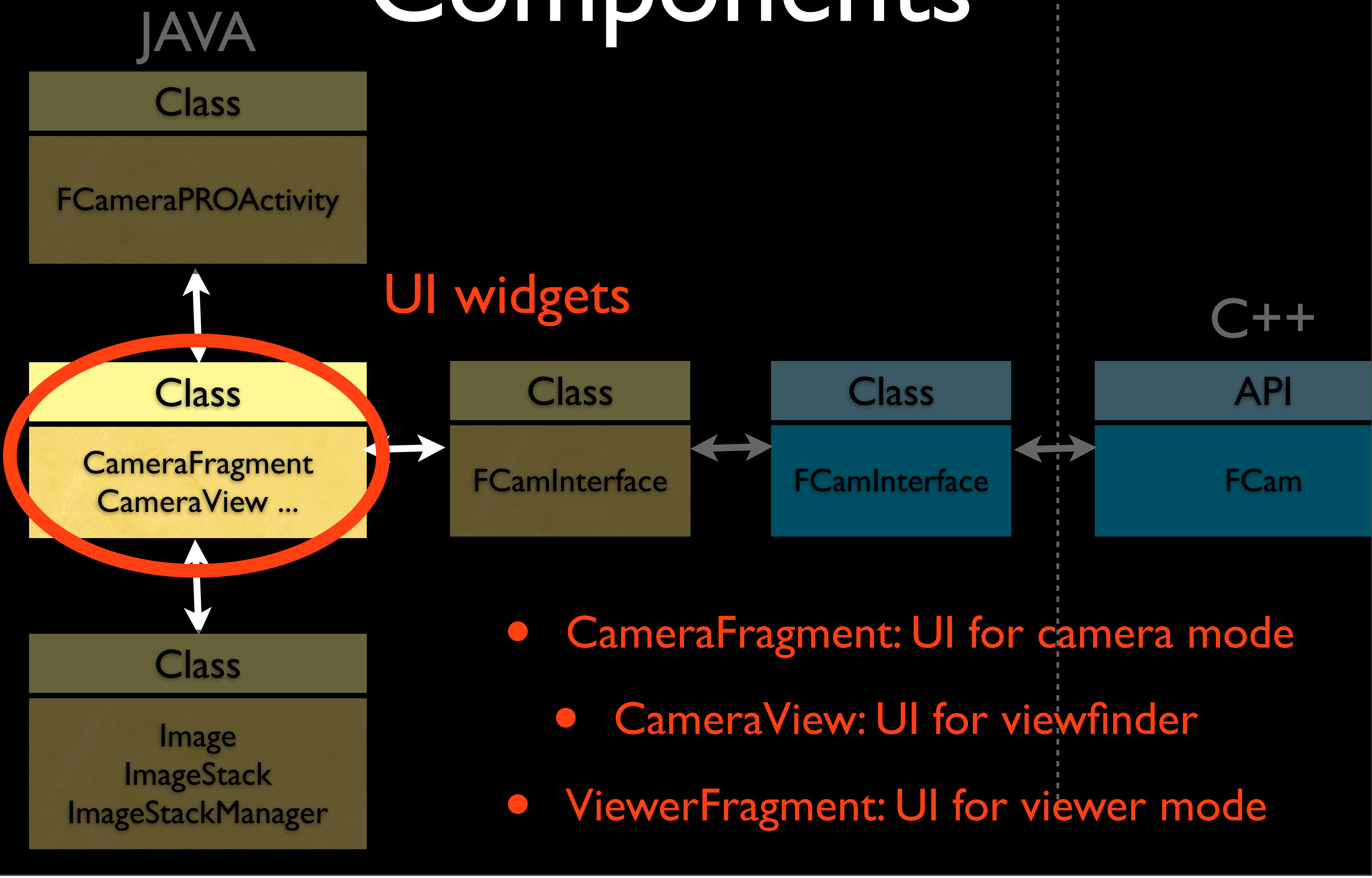
Components



“main” class

- Initialization
- Build UI

Components



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FCamInterface

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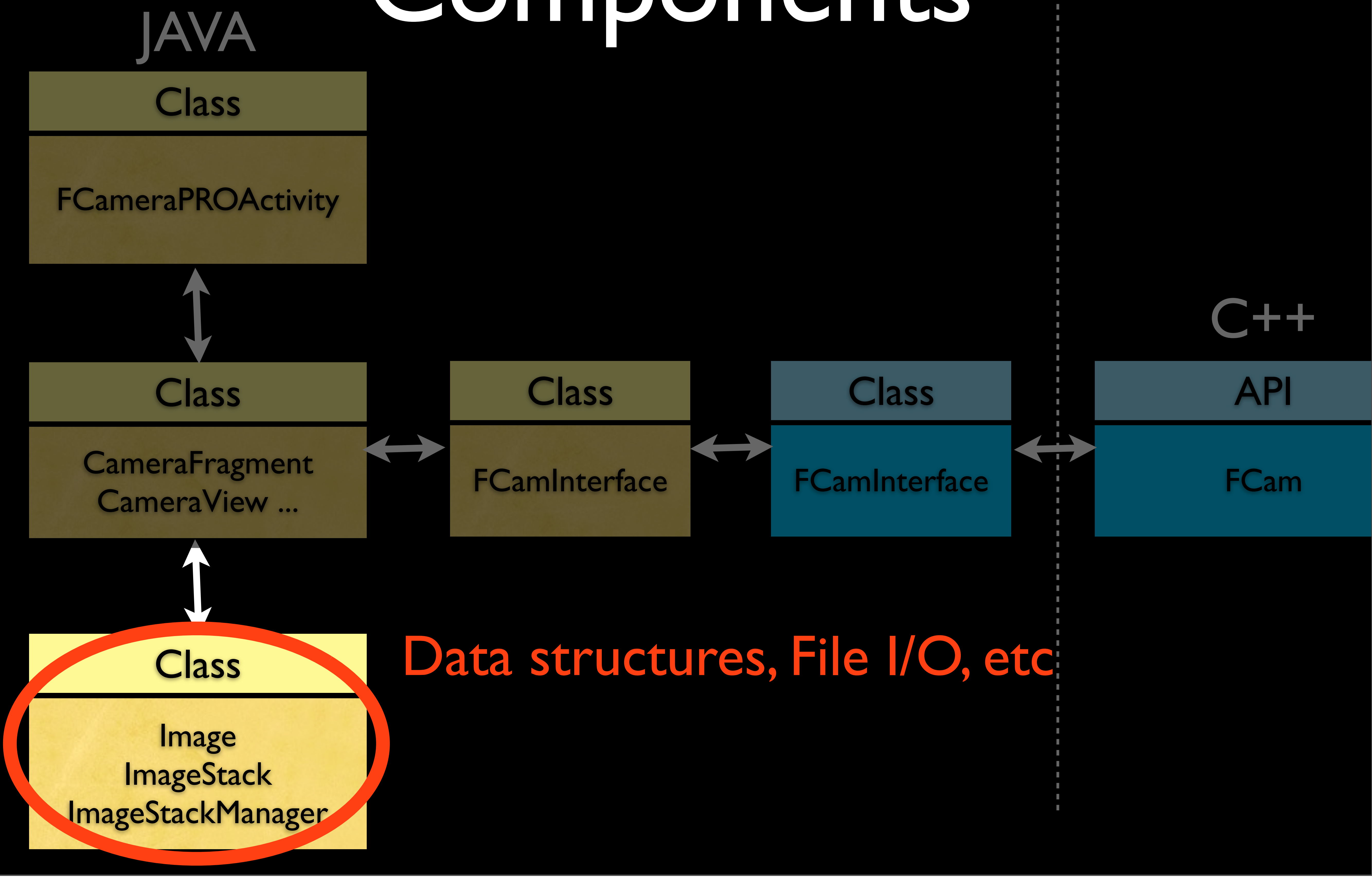
UI widgets

- CameraFragment: UI for camera mode
  - CameraView: UI for viewfinder
- ViewerFragment: UI for viewer mode

Components



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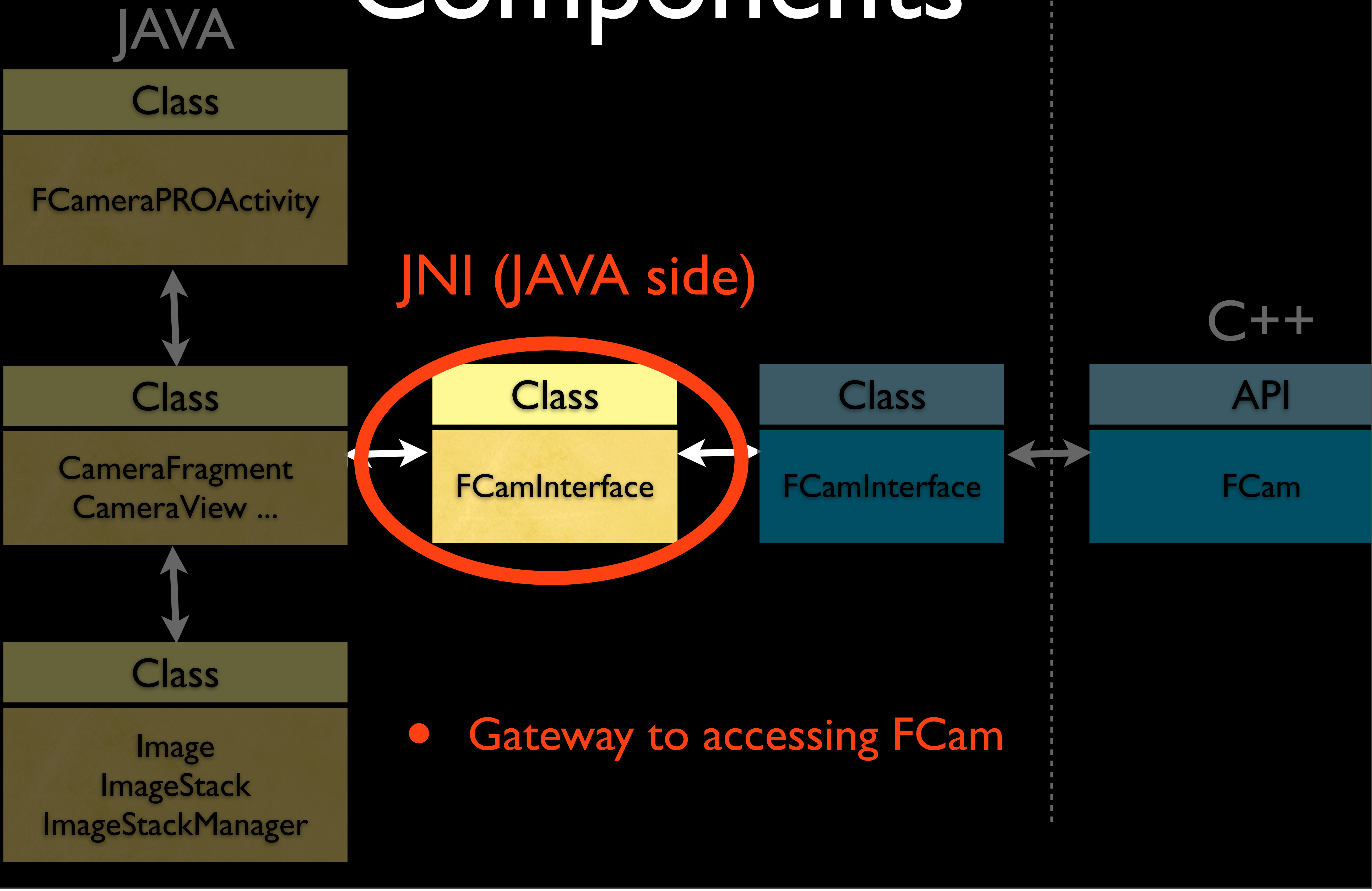
Data structures, File I/O, etc

Components



JAVA

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JNI (JAVA side)

Class

FCamInterface

Class

FCamInterface

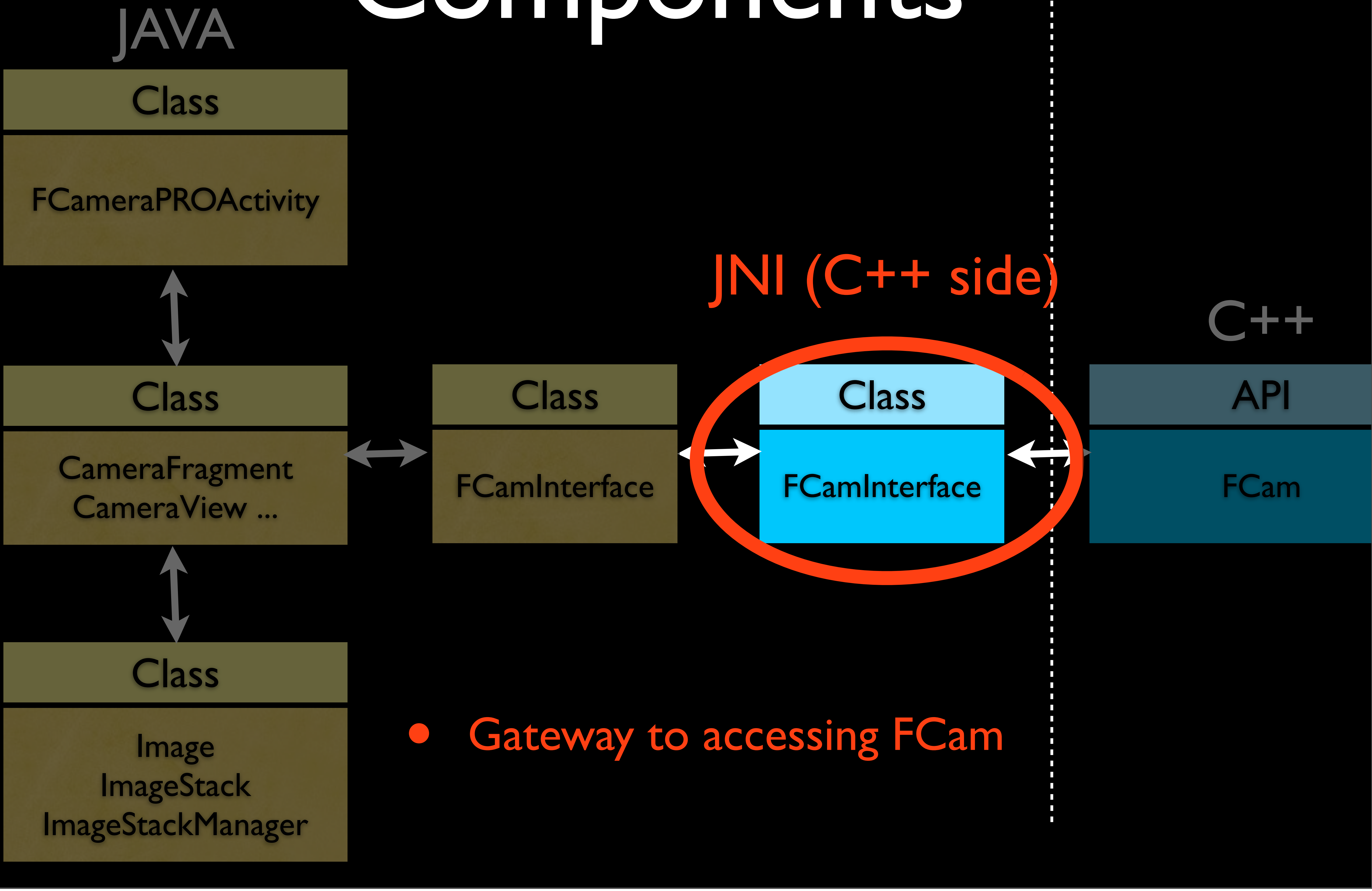
C++

API

FCam

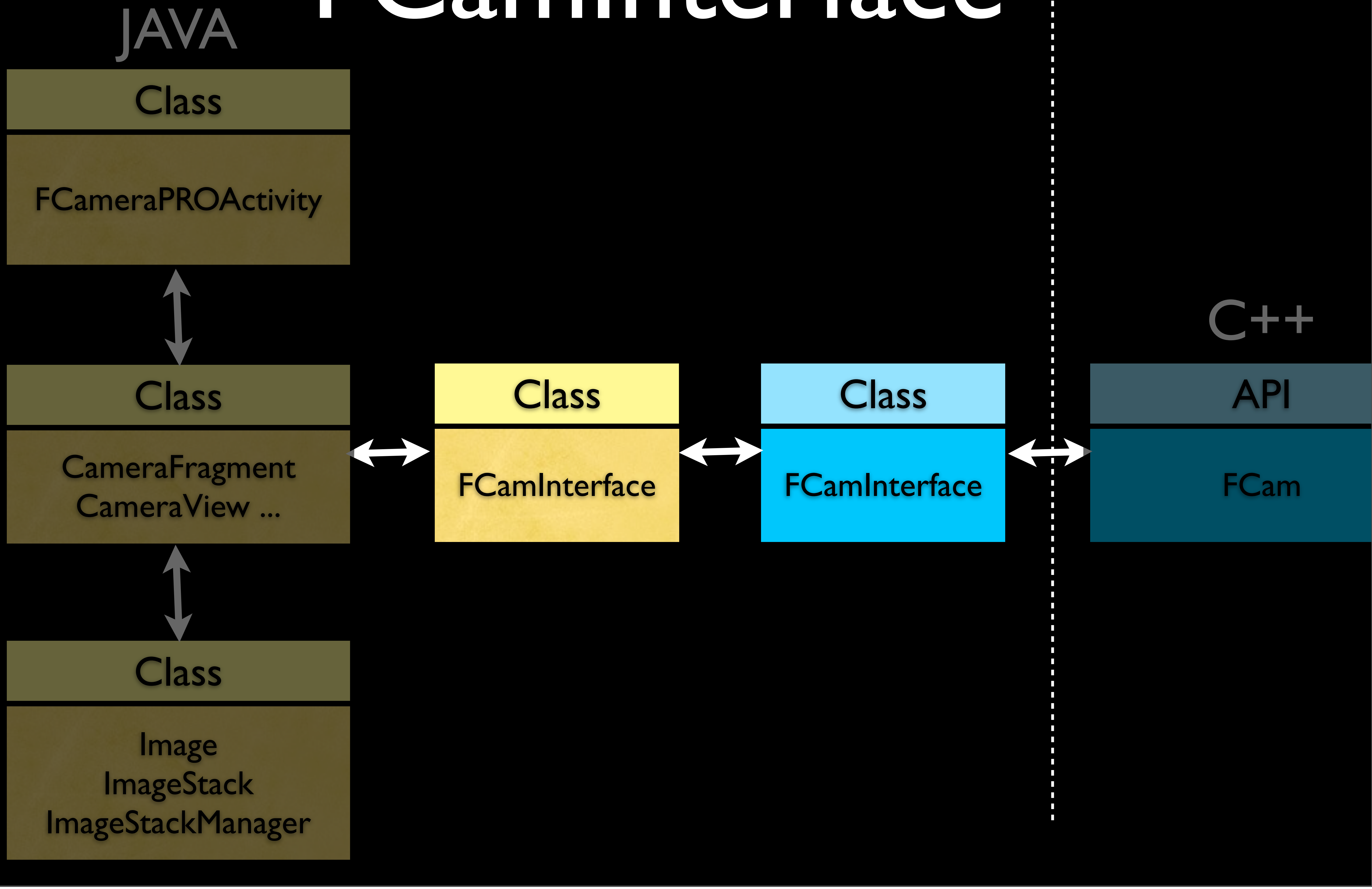
- Gateway to accessing FCam

Components



- Gateway to accessing FCam

FCamInterface



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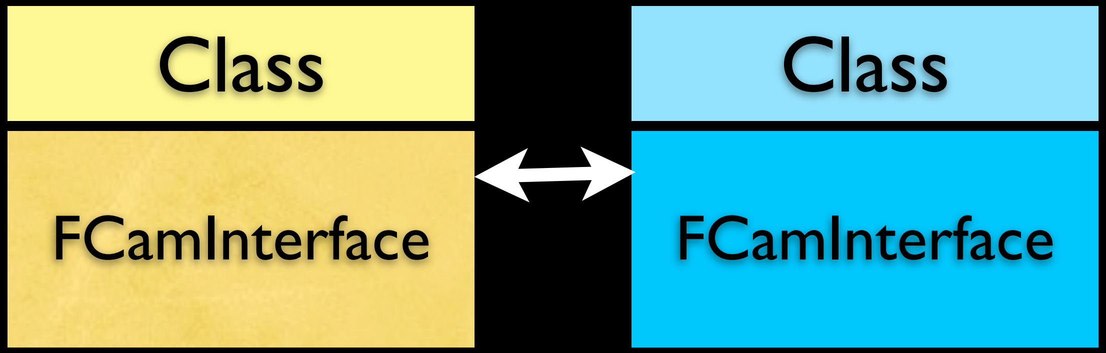
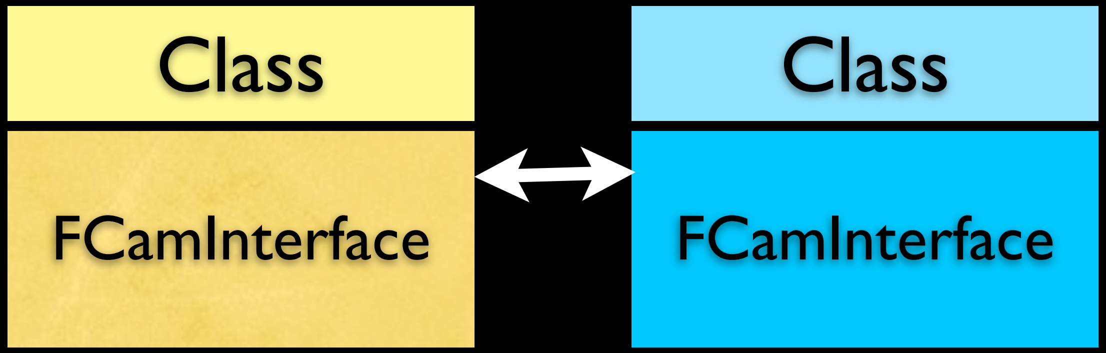


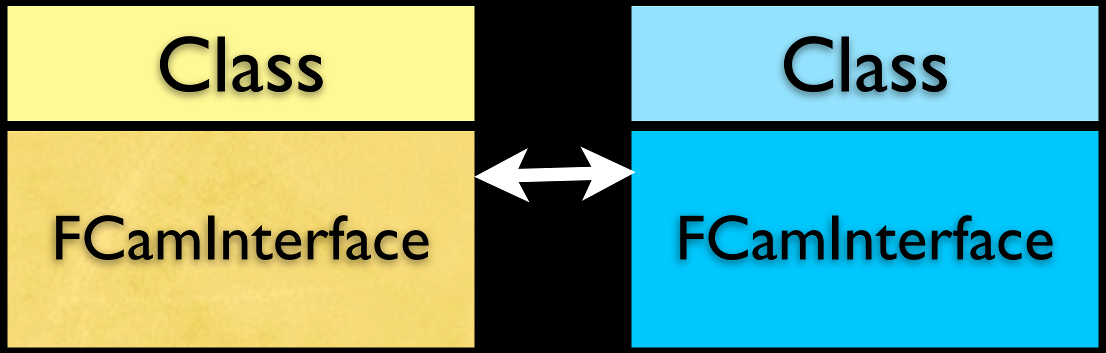
FCamInterface



- C++ side runs a work thread
  - Three tasks in infinite loop

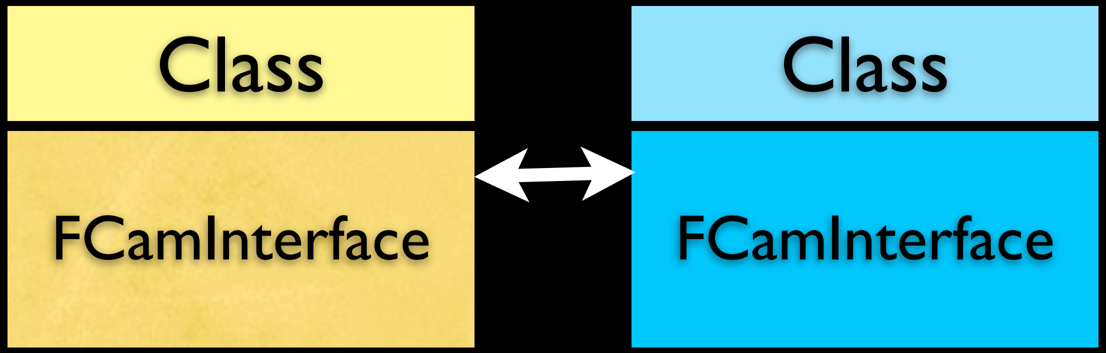
Parse any pending requests.
Apply the parsed requests (via FCam)
Retrieve image from FCam and process.

FCamInterface



- JAVA side asks the C++ side to enqueue new requests.
  - Calls the appropriate native method that create and enqueues a message.
    - Each request carries an int specifying the type.

FCamInterface



- If your Android app wants to talk to FCam,
  - Call the right FCamInterface method to put in the right request,

    OR
  - Make a new request type and add code to parse it in FCamInterface.

MyAutoFocus.h

- Take a look at MyAutoFocus.h.
  - Two functions defined
    - void startSweep()
    - void update(...)
  - Implement these, and call them appropriately from the work loop.

Example Flow

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(Summary Slide)

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Demo